

WHAT IS CLAIMED IS:

1 1. A method comprising:
2 in response to obtaining first data for replication to a secondary storage area,
3 causing an indicator to be set for a first location, wherein
4 the first data are stored in the first location of a first storage area, and
5 the indicator indicates that the first data are unsynchronized with
6 corresponding data in a corresponding location of the secondary
7 storage area.

1 2. The method of claim 1 further comprising:
2 causing an update identifier to be added to a set of updates to the first location.

1 3. The method of claim 2 further comprising:
2 in response to a transaction writing the first data to the first location of the first storage area,
3 writing the first location to a log for the transaction.

1 4. The method of claim 2 further comprising:
2 in response to receiving an acknowledgement that the first data have been written to the
3 secondary storage area,
4 causing the first location to be removed from each active transaction of at least one
5 active transaction in the log, and
6 causing the update identifier to be removed from the set of updates to the first
7 location.

1 5. The method of claim 4 further comprising:
2 if one active transaction of the at least one active transaction in the log is completed,
3 writing a record to the log indicating that the one active transaction is complete.

1 6. The method of claim 5, further comprising:
2 in response to the writing the record to the log, freeing space in the log previously used by the
3 one active transaction.

1 7. The method of claim 4 further comprising:
2 in response to removing the update identifier from the set of updates to the first location,
3 determining whether the set of updates to the first location is empty; and
4 if the set of updates to the first location is empty,
5 resetting the indicator for the first location.

8. The method of claim 4 further comprising:
in response to removing the update identifier from the set of updates to the first location,
determining whether the set of updates to the first location is empty, and
if the set of updates to the first location is empty,
causing the indicator for the first location to be reset.

9. The method of claim 4 wherein
the causing the update identifier to be removed from the set of updates to the first location
comprises
removing the update identifier from the set of updates to the first location.

10. The method of claim 2 wherein
the causing the indicator to be set comprises setting the indicator.

11. The method of claim 2 wherein
the causing the update identifier to be added to the set of updates to the first location
comprises adding the update identifier to the set of updates to the first location.

12. The method of claim 2 wherein
if an acknowledgement that the first data have been written to the secondary storage area is
not received,
causing the indicator to be written to a persistent storage area.

13. The method of claim 12 further comprising:
using the indicator to synchronize the first data in the first location of the first storage area
with the corresponding data in the corresponding location of the secondary storage
area.

14. A system comprising:
causing means for causing an indicator to be set for a first location in response to obtaining
first data for replication to a secondary storage area, wherein
the first data are stored in the first location of a first storage area, and
the indicator indicates that the first data are unsynchronized with corresponding data
in a corresponding location of the secondary storage area; and
second causing means for causing an update identifier to be added to a set of updates to the
first location.

1 15. The system of claim 14 further comprising:
2 writing means for writing the first location to a log for a transaction in response to the
3 transaction writing the first data to the first location of the first storage area.

1 16. The system of claim 15 further comprising:
2 third causing means for causing the first location to be removed from each active transaction
3 of at least one active transaction in the log in response to receiving an
4 acknowledgement that the first data have been written to the secondary storage area,
5 and
6 fourth causing means for causing the update identifier to be removed from the set of updates
7 to the first location in response to receiving the acknowledgement.

1 17. The system of claim 16 further comprising:
2 second writing means for writing a record to the log indicating that one active transaction is
3 complete if the one active transaction of the at least one active transaction in the log is
4 completed.

1 18. The system of claim 16 further comprising:
2 determining means for determining whether the set of updates to the first location is empty in
3 response to removing the update identifier from the set of updates to the first location;
4 and
5 resetting means for resetting the indicator for the first location if the set of updates to the first
6 location is empty.

1 19. A computer-readable medium comprising:
2 causing instructions to cause an indicator to be set for a first location in response to obtaining
3 first data for replication to a secondary storage area, wherein
4 the first data are stored in the first location of a first storage area, and
5 the indicator indicates that the first data are unsynchronized with corresponding data
6 in a corresponding location of the secondary storage area.

1 20. The computer-readable medium of claim 19 further comprising:
2 second causing instructions to cause an update identifier to be added to a set of updates to the
3 first location.

21. The computer-readable medium of claim 20 further comprising:
writing instructions to write the first location to a log for a transaction in response to the
transaction writing the first data to the first location of the first storage area.

22. The computer-readable medium of claim 21 further comprising:
third causing instructions to cause the first location to be removed from each active
transaction of at least one active transaction in the log in response to receiving an
acknowledgement that the first data have been written to the secondary storage area,
and
fourth causing instructions to cause the update identifier to be removed from the set of
updates to the first location in response to receiving the acknowledgement.

23. The computer-readable medium of claim 22 further comprising:
second writing instructions to write a record to the log indicating that one active transaction is
complete if the one active transaction of the at least one active transaction in the log is
completed.

24. The computer-readable medium of claim 22 further comprising:
determining instructions to determine whether the set of updates to the first location is empty
in response to removing the update identifier from the set of updates to the first
location; and
resetting instructions to reset the indicator for the first location if the set of updates to the first
location is empty.

25. A computer system comprising:
a processor, and
the computer-readable medium of claim 19, wherein
the computer-readable medium is coupled to the processor.

26. A system comprising:
a causing module to cause an indicator to be set for a first location in response to obtaining
first data for replication to a secondary storage area, wherein
the first data are stored in the first location of a first storage area, and
the indicator indicates that the first data are unsynchronized with corresponding data
in a corresponding location of the secondary storage area.

27. The system of claim 26 further comprising:

a second causing module to cause an update identifier to be added to a set of updates to the first location.

28. The system of claim 27 further comprising:

a writing module to write the first location to a log for a transaction in response to the transaction writing the first data to the first location of the first storage area.

29. The system of claim 28 further comprising:

a third causing module to cause the first location to be removed from each active transaction of at least one active transaction in the log in response to receiving an acknowledgement that the first data have been written to the secondary storage area, and
a fourth causing module to cause the update identifier to be removed from the set of updates to the first location in response to receiving the acknowledgement.

30. The system of claim 29 further comprising:

a second writing module to write a record to the log indicating that one active transaction is complete if the one active transaction of the at least one active transaction in the log is completed.

31. The system of claim 29 further comprising:

a determining module to determine whether the set of updates to the first location is empty in response to removing the update identifier from the set of updates to the first location; and
a resetting module to reset the indicator for the first location if the set of updates to the first location is empty.